Remarks/Arguments:

Claims 80 and 84 have been amended. Claims 91-94 have been added. No new matter is introduced herein. Claims 78-80, 82-84 and 86-94 are pending. Of the pending claims, claim 78, 79 and 86-90 were previously withdrawn.

Claims 80 and 82 and 84 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. At page 3, lines 15-18 of the Office Action, the Examiner acknowledges that the subject application describes remotely disposing the wavelength conversion element away from the heat generated by the semiconductor laser to prevent temperature variation. However, the Examiner asserts on page 2 of the Office Action, that the feature "the single mode fiber is configured to prevent a variation in temperature of the wavelength conversion element caused by a heat generated from the semiconductor laser" is not described in the specification. In addition, the Examiner asserts that it is not clear how the fiber would be configured to prevent a variation in temperature. Claim 80 and 84 have been amended to clarify that the placement of the optical fiber prevents a variation in temperature of the wavelength conversion element. In particular, claims 80 and 84 have been amended to clarify that the fiber is positioned between the semiconductor laser and the optical wavelength conversion element. Basis for the amendment can be found, for example, at Figs. 24-26 and 33, which clearly show that the semiconductor laser is spaced away from the optical wavelength element via the fiber. As discussed at page 55, lines 15-19, and as acknowledged by the Examiner, this positioning allows the fiber recited in claims 80 and 84 to prevent a variation in temperature of the optical wavelength conversion element caused by heat generated from the semiconductor laser. Accordingly, Applicants respectfully request that the rejection of claims 80 and 82-84 under 35 U.S.C. § 112, first paragraph, be withdrawn.

Claims 80 and 82 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Byer et al. (U.S. Pat. No. 5,036,220) in view of Tanabe (U.S. Pat. No. 5,119,361). It is respectfully submitted, however, that these claims are now patentable over the cited art for the reasons set forth below.

Claim 80, as amended, includes features neither disclosed nor suggested by the cited art, namely:

> ... a semiconductor laser ... having an output greater than or equal to 1W ...
>
> ... a bulk type optical wavelength conversion element without an optical waveguide ...
>
> ... the fiber is configured to prevent a variation in temperature of the optical wavelength conversion element caused by a heat generated from the semiconductor laser, the fiber being positioned between the semiconductor laser ... (Emphasis added)

Claim 84 includes a similar recitation. Support for the amendment to claims 80 and 84 can be found, for example, at p. 57, lines 5-6 and p. 65, lines 32-33 (semiconductor laser having an output greater than or equal to 1W); and Fig. 25 (a bulk type optical wavelength conversion element without an optical waveguide). With respect to claim 84, although Fig. 26 illustrates an optical wavelength conversion element with optical waveguide 2, p. 66, lines 23-26 of the specification describes that the solid state laser can be located near the semiconductor laser as well as near the optical wavelength conversion element. Fig. 25 (related to claim 80) shows solid state laser 21 near optical wave length conversion element 25 and Fig. 26 (related to claim 84) shows solid state laser 21 near semiconductor laser 20. Accordingly, the skilled person would understand, based on p. 66, lines 23-26 of the specification, that the bulk wavelength conversion element without an optical waveguide shown in Fig. 25 may be used when the solid state laser 21 is near semiconductor laser 20 (as shown in Fig. 26 and recited in claim 84).

Byer et al disclose, in Fig. 1, an optical fiber 17 disposed between a laser diode 12 (or a solid state laser) and a nonlinear optical generator 11 (col. 3, line 67-col. 4, line 5), where nonlinear optical generator 11 includes waveguide 13 (col. 4, lines 5-10). Byer et al. do not disclose or suggest Applicants' claimed features of "a bulk type optical wavelength conversion element without an optical waveguide" or that "the fiber is configured to prevent a variation in temperature of the optical wavelength conversion element caused by heat generated by the semiconductor laser" (emphasis added). Byer et al do not disclose or suggest these features. According to Byer et al.,

optical fiber 17 is used as a means to convey the output of laser diode 12 (col. 4, lines 29-39). However, Byer et al do not disclose or suggest that the optical fiber 17 is configured to prevent a variation in temperature of the nonlinear optical generator 11. Byer et al are silent regarding a bulk type optical wavelength conversion element without an optical waveguide. As acknowledged by the Examiner, Byer et al do not specifically disclose a semiconductor laser for emitting a pumping light and a fiber for conveying the pumping light to the solid state laser crystal and thus cannot disclose that a semiconductor laser has an output greater than or equal to 1W. Thus, Byer et al do not include all of the features of claim 80.

Tanabe discloses, in Figs. 3 and 4, a semiconductor laser that provides pumped light from a semiconductor laser to laser rod 15 via an optical fiber 12 (col. 4, lines 38-42). In addition, Tanabe discloses that when an optical fiber is used, the light source for pumping is kept immobile (col. 2, lines 48-53). Thus, when semiconductor laser 20 is secured, optical fiber 12 is used for movement of parts, such as laser rod 15, of the optical system. Specifically, the arrangement of optical fiber 12 depends on the positional relationship between semiconductor laser 20 and the optical system, such as laser rod 15. Indeed, Byer et al. disclose that the semiconductor laser 20 may be used without optical fiber 12 when laser 20 is arranged in the vicinity of resonating mirror 14 (col. 4, lines 64-68). Furthermore, as shown in Fig. 2 of Tanabe, the output of semiconductor laser 20 is in the range of 10 to 30mW.

Tanabe does not make up for the features that are lacking in Byer et al. Tanabe does not disclose or suggest a semiconductor laser having an output greater than or equal to 1W, a bulk type optical wavelength conversion element without an optical waveguide and a fiber configured to prevent a variation in temperature of the optical wavelength conversion element. These features are neither disclosed nor suggested by Tanabe. Instead, Tanabe discloses that the low output of semiconductor laser is in the range of 10 to 30mW, a relatively low output. Because the output of the semiconductor laser of Tanabe is relatively low, Tanabe does not need to consider a variation in temperature of the wavelength conversion element caused by heat generated from a semiconductor laser.

Claim 80 includes advantages over the systems of Byer et al. and Tanabe. The semiconductor laser of the subject invention has an output greater than or equal to

1W. Thus, the fiber of the subject invention is positioned between the semiconductor laser and the optical wavelength conversion element in order to prevent a variation in temperature of the optical wavelength conversion element, caused by heat generated from the high output (i.e., greater than or equal to 1W output) of the semiconductor laser. Thus, an output from a fundamental wave provided to the optical wavelength conversion element is improved. Accordingly, a conversion efficiency of the optical wavelength conversion element to be improved. These features and advantages are specifically described at p. 52, lines 29-33 and p. 66, lines 11-17 of the original specification. In addition, because a high output, (i.e., greater than or equal to 1W output) semiconductor laser is used, the conversion efficiency of a bulk type optical wavelength conversion element, that does not include an optical waveguide, is improved.

As recited in claims 80 and 84, the optical wavelength conversion element is spaced away from heat generated from the high output semiconductor laser, by positioning the fiber between the semiconductor laser and the optical wavelength conversion element. In this manner, a variation in temperature of the optical wavelength conversion element, caused by heat generated from the high output semiconductor laser, is prevented. In contrast, Tanabe discloses a relatively low output (i.e., between 10 to 30mW output) semiconductor laser. Tanabe does not need to consider a variation in temperature of the wavelength conversion element caused by heat generated from the semiconductor laser. Indeed, Tanabe does not disclose or suggest that a fiber is configured to prevent a variation in temperature of the optical wavelength conversion element. Accordingly, Byer and Tanabe, either alone or in combination, do not disclose or suggest all of the features and advantages of claim 80. Accordingly, allowance of claim 80 is requested.

Claim 82 includes all of the features of claim 80 from which it depends. Accordingly, claim 82 is also patentable over the cited art.

Claim 83 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Byer et al. in view of Tanabe, and further in view of Hanihara (U.S. Pat. No. 5,430,756). This claim, however, includes all of the features of claim 80 from which it depends. Hanihara does not make up for the features that are lacking in Byer et al. and Tanabe. Namely, a semiconductor laser having an output greater than or equal to

1W, a bulk type optical wavelength conversion element without an optical waveguide and a fiber configured to prevent a variation in temperature of the optical wavelength conversion element. Accordingly, claim 83 is also patentable over the cited art.

Claim 84 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Byer et al. in view of Tanabe and further in view of Covey (U.S. Pat. No. 4,919,506). It is respectfully submitted, however, that this claim is now patentable over the cited art for the reasons set forth below.

Amended claim 84, although not identical to claim 80, includes similar features neither disclosed nor suggested by the cited art. Namely, a semiconductor laser having an output greater than or equal to 1W, a bulk type optical wavelength conversion element without an optical waveguide and a single mode fiber configured to prevent a variation in temperature of the optical wavelength conversion element.

Byer et al. and Tanabe are discussed above. Covey discloses coupling of a solid state laser beam into a single-mode optical fiber (col. 1, lines 7-22). Covey does not make up for the features that are lacking in Byer et al, Tanabe, and Yao et al. Namely, a semiconductor laser having an output greater than or equal to 1W, a bulk type optical wavelength conversion element without an optical waveguide and a single mode fiber configured to prevent a variation in temperature of the optical wavelength conversion element. Accordingly, allowance of claim 84 is respectfully requested.

Claims 91-94 have been added. No new matter is introduced herein. Basis for claims 91 and 92 can be found at respective Figs. 25 and 26. Basis for claims 93 and 94 can be found, for example, at p. 66, lines 15-17 and Figs. 25 and 26 of the original specification. Claims 91-94 include all of the features of respective claims 80 and 84 from which they depend. With respect to claim 91, the solid state laser crystal is attached to the optical wavelength conversion element. Thus, a coupling efficiency of a light ray outputted from the solid laser crystal with the wavelength conversion element can be improved. In contrast, Byer et al. show, in Figs. 1 and 2, that the outputted light ray from the solid state laser crystal is guided to the wavelength conversion element by lens 19 or fiber 17. Thus, Byer does not disclose nor suggest the features of claim 91. With respect to claim 92, the single mode fiber is connected between the solid state laser crystal and the optical wavelength conversion element. Thus, it is possible to prevent a variation in temperature of the optical wavelength

element caused by heat generated by the high output (i.e., greater than or equal to 1W output) of the semiconductor laser. In contrast, Tanabe discloses, in Figs. 3 and 4, that the fiber is disposed between the semiconductor laser and the solid state laser crystal. Thus, Tanabe does not disclose or suggest the features of claim 92. Accordingly, claims 91-94 are also allowable over the cited art for at least the reasons set forth above.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,

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